

Atty Dkt. No.: 10004190-1
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REMARKS

In view of the following remarks, the Examiner is requested to allow Claims 28, 29, 31, 35, and 37-45, the only claims pending in this application.

Claims 29, 31, 35 and 37-44

The Applicants note that claims 28 and 45 are the only claims that are rejected over art. Since the other claims (i.e., claims 29, 31, 35 and 37-44) are not rejected over art in this Office Action, they are believed to be free of the art.

Acknowledgement of such is respectfully requested.

Claim Rejections - 35 USC § 112, First Paragraph (written description)

Claims 28, 29, 31, 35, and 37-45 remain rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the written description requirement.

According to the M.P.E.P. § 2163.02, to satisfy the written description requirement, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, and that the invention, in that context, is whatever is now claimed. The test for sufficiency of support in a patent application is whether the disclosure of the application relied upon reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter.

Further, the Written Description Guidelines and current caselaw, using no uncertain terms, state that the specification of a patent application need only be described in detail that which is new or not conventional.

For example, on page 1105 of the Guidelines it is stated: "The claimed invention as a whole may not be adequately described if the claims require an essential or critical feature which is not adequately described in the specification and which is not conventional in the art or known to one of skill in the art"

Also, on page 1105 of the Guidelines it is stated: "Information which is well known in the art need not be described in detail in the specification"

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On page 1106, the Guidelines state: "The description need only describe in detail that which is new or not conventional" and "What is conventional or well known to one of ordinary skill in the art need not be disclosed in detail".

It is the Applicant's understanding that all of the elements to which the Examiner points to as being inadequately described (namely the substrate and the chemical moieties on the substrate) are conventional and well known to one of ordinary skill in the art.

Since those elements are conventional and given the explicit instructions of the Written Description Guidelines, it is the Applicant's understanding that those elements need not be described in great detail.

Given the instant specification and what is already known about the chemical arrays and substrates, the Applicants submit that the claims of this case meet the written description requirement of 35 U.S.C. § 112, first paragraph.

The Applicants believe that this rejection has been adequately addressed. To the extent that further discussion is deemed necessary, the Examiner is respectfully referred to the following.

Below are the contentions of the Applicants with respect to the multiplicity of arguments that the Office has advanced in support of this rejection. For purposes of clarity, the Applicants have responded to each argument advanced by the Office as indicated by the subheadings below and have grouped the claims based on the similarities of their elements.

A. "The claims encompass the use of virtually an infinite number of substrates."

The Office asserts that the rejected claims encompass virtually an infinite number of substrates. The Applicants respectfully disagree.

Claims 28 and 45 are directed to a method that includes a substrate that has a planar surface. As such, any substrate that does not have a planar surface is out

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side of the metes and bounds of Claims 28 and 45. Claim 29 is directed to a method that includes a substrate that has been drawn. As such, any substrate that has not been drawn is excluded from the metes and bounds of Claim 29. Claims 37 and 38 are drawn to a method that includes a substrate that inherently has a higher height uniformity along a first direction than a second direction. As such, any substrate that does not have a higher height uniformity along a first direction than a second direction is excluded from the metes and bounds of Claims 37 and 38.

In view of the above, the Applicants contend that this assertion of the Office is erroneous because the claimed substrates are in fact limited in various ways so as to exclude embodiments that would not be compatible with the claimed methods. Specifically, it is only those substrates that have a planar surface, have been drawn and/or have a higher height uniformity along a first direction than a second direction that are covered by the metes and bounds of the claims; all other substrates which do not meet these claim limitations are outside the scope of the claims. Additionally, the Applicants contend that one of skill in the art would readily understand, in view of the teachings of the specification, what is meant by a planar substrate (see FIG.1 and page 21, lines 5 to 11), a drawn substrate (see page 3, lines 16 to 26 and page 8, lines 16 to 20), and a substrate that has a higher height uniformity along a first direction than a second direction (see page 7, line 30 to page 8, line 7). Hence, contrary to the assertions of the Office, the rejected claims do not encompass virtually an infinite number of substrates, and the Applicants contend that one of skill would understand this and not doubt that the Applicants had possession of the claimed invention at the time of filing the application.

B. "The methods encompass substrates that do not possess a first direction that has higher height uniformity than a second direction as required by independent claims 28, 37, 38 and 45."

The Office asserts that the rejected claims encompass substrates that do not possess a first direction that has higher height uniformity than a second direction. The Applicants respectfully disagree.

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With respect to Claims 28 and 45, these claims are directed to a method that includes comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher substrate height uniformity than a second direction. With respect to Claims 28 and 45, the Office appears to be arguing that because a planar substrate may have a "random topology" the substrate necessarily does not have a "first direction having higher substrate height uniformity than a second direction." The Applicants respectfully disagree.

The Applicants' specification teaches that height uniformity of a substrate surface refers to the variation in relative height of the surface moving across the surface in a predetermined direction. Simply because a planar substrate may have a "random topology" does not necessarily mean that the surface does not have a "first direction having higher substrate height uniformity than a second direction." Rather, it means that in order to determine the height uniformity of the substrate surface in the different directions one might have to integrate the various variations along the chosen direction to come up with the overall surface variation in that chosen direction. The Applicants contend that one of skill in the art could readily and routinely perform such a calculation. Hence, once these calculations have been made for both directions, one of skill in the art could readily determine which direction has a higher substrate height uniformity. Therefore, the Applicants contend that given the knowledge of one of skill in the art, and in view of the teachings of the specification (see page 8, lines 2 to 6), one of skill in the art would not doubt that the Applicants had possession of the claimed invention at the time of filing the application.

With respect to Claims 37 and 38, these claims are drawn to a method that includes receiving from a remote location both a) a substrate and b) an identification of a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate. Implicit within this claim language is the fact that the substrate has a higher height uniformity along a first direction than along a second direction. This is implicit within the claim language because step (b) of the claim recites that "an identification of a

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first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction" is received from a remote location. If the substrate did not have a higher height uniformity along a first direction than along a second direction then the element of step (b) would be meaningless. The Applicants contend that one of skill in the art would comprehend this and clearly understand that Claims 37 and 38 inherently include a substrate that does in fact have "a higher height uniformity along a first direction than along a second direction." Hence, one of skill in the art would not doubt that the Applicants had possession of the claimed invention.

However, even if such were not the case, the elements of the claims do not depend on whether the substrate actually has a higher height uniformity along a first direction than along a second direction, so long as an identification of such, as recited in step (b), is received from the remote location. Hence, all that Claims 37 and 38 basically require is the receipt of the substrate, receipt of the identification and the placement of chemical moieties on the substrate. The Applicants contend that one of skill in the art would understand this and would know how to receive a substrate and the requisite identification from a remote location and, thus, would know how to fabricate an array in accordance with the teachings in the specification. Hence, one of skill in the art would not doubt that the Applicants had possession of the claimed invention.

C. "Applicants' claims encompass substrates that likewise cannot possess a first direction that has higher height uniformity than a second direction planar to said substrate."

The Office asserts that the Applicants' claims encompass substrates that cannot possess a first direction that has higher height uniformity than a second direction planar to said substrate. Specifically, the Office appears to be asserting that the Applicants claims encompass spherical substrates that do not possess a planar surface and/or substrates that are too brittle to be drawn. The Applicants respectfully disagree.

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The Office appears to be reading into the claims elements described in the specification but not recited in the language of the claims. While it is true the specification describes a wide variety of materials that may perform the function of a substrate, the claims limit those possible materials by requiring that the substrate contain a planar surface (i.e., Claims 27 and 45) or that the substrate be drawn (i.e., Claim 29). Hence, because the claims recite a substrate that has a planar surface or a substrate that is drawn, the Applicants contend that one of skill in the art would readily understand that substrates that do not have a planar surface (e.g., spherical substrates) or substrates that are not drawn (e.g., are too brittle to be drawn) are excluded from the metes and bounds of the claims. Hence, contrary to the assertions of the Office the Applicants' are not claiming any and all substrates.

Therefore, this assertion by the Office is erroneous, because the claims specifically exclude substrates that do not possess a planar surface (e.g., Claims 28 and 45), or substrates that cannot be drawn (Claim 29), the rejected claims do not encompass substrates that cannot possess a first direction that has higher height uniformity than a second direction.

Further, with respect to Claims 37 and 38, as described above, all that matters is the receipt of a substrate and receipt of an *identification* of a higher height uniformity along a first direction than along a second direction of the substrate. The specification clearly teaches the requisite receipt and identification as recited in Claims 37 and 38. See, for instance, page 17, line 3 to page 20, line 10.

In view of the above, the Applicants contend that one of skill in the art would not doubt that the Applicants had possession of the claimed invention.

D. "No structural limitations are placed on the 'chemical moieties' that are used to form the array."

The Office asserts that the Applicants have set forth no structural limitations on the 'chemical moieties' that are used to form the array. Essentially, the Office appears to be arguing that without reciting the precise chemical moieties that may be

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used in conjunction with the claimed methods one of skill in the art would doubt that the Applicants had possession of the claimed invention. The Applicants respectfully disagree and would like to draw the attention of the Office to the fact that not all chemical moieties are being claimed, rather, only those that are capable of being deposited via the use of an inkjet printer. That being said, the ability to identify on a substrate surface a higher substrate height uniformity does not depend on what type of chemical moiety is being used in the fabrication of the array. The use of ink-jet printing in the fabrication of arrays is well known and widely practiced in the art. Specifically, methods of depositing chemical moieties are taught throughout the specification, for instance, page 12, line 1 to page 14, line 13. In view of this, the Applicants contend that one of skill in the art would not doubt that the Applicants had possession of the claimed invention.

In view of the above, the Applicants contend that the assertions by the Office are erroneous and that one of skill would not doubt that the Applicants had possession of the claimed invention. Consequently, the Applicants respectfully request that the 35 U.S.C. § 112, first paragraph, rejection of Claims 28, 29, 31, 35, and 37-45 be withdrawn.

Claim Rejections - 35 USC § 112, First Paragraph (enablement)

Claims 28, 29, 31, 35, and 37-45 were rejected under 35 U.S.C. § 112, first paragraph, for allegedly not being enabled for methods that lead to the production of any chemical moiety on any substrate surface. Rather, the Office asserts that the claims are enabled for forming an array of oligonucleotides on a rectangular substrate of drawn glass.

According to the MPEP § 2164.01 an analysis of whether a particular claim is supported by the disclosure in an application requires a determination of whether that disclosure, when filed, contained sufficient information regarding the subject matter of the claims so as to enable one skilled in the pertinent art to make and use the claimed invention. The test of enablement is whether one reasonably skilled in

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the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.

The Office asserts that the rejected claims are not enabled for several reasons. The Office asserts that the claims encompass virtually an infinite number of substrates. As set forth above, the Applicants disagree and contend that the claims specifically exclude all substrates that do not possess a planar surface, those that cannot be drawn, and those that are not identified as having a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction. Accordingly, as the claims exclude various embodiments of substrates that are outside the metes and bounds of the claim elements, this assertion by the Office is erroneous.

The Office further asserts that the state of the art and level of predictability is low. The Applicants disagree. The claims are drawn to methods of fabricating arrays of different chemical moieties on the surface of a substrate. The Applicants contend that the general technology of array fabrication has been around for years. In fact, as evidenced by Agilent, whole industries have grown around this type of technology. For instance, academic institutions all over the nation like Stanford and Harvard regularly employ these technologies in biological research. Hence, contrary to the assertion of the Office, the Applicants contend that the level of skill in the array fabrication arts is relatively high.

Further still, the Office asserts that the quantity of experimentation need to make or use the invention is great. The Applicants respectfully disagree. The specification teaches how to determine surface height variations so as to generate a height uniformity (see page 4, lines 6 to 9 and page 7, line 30 to page 8, line 8). The specification also teaches exemplary substrates which may be used in accordance with the methods of the invention (see page 9, lines 3 to 17). Further still, the specification teaches how to use an inkjet printer to deposit a chemical moiety on the surface of the substrate in accordance with the elements of the claimed invention (see page 11, line 27 to page 20, line 29).

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Therefore, in view of the knowledge of one of skill in the art and in light of the Applicants' extensive teachings regarding the claimed methods, there is no reason to believe that one of skill in the art could not practice the claimed invention without undue experimentation. Consequently, the Applicants respectfully request that the 35 U.S.C. § 112, first paragraph, rejection of Claims 28, 29, 31, 35, and 37-45 be withdrawn.

Claim Rejections - 35 USC § 102

Claim 45 reamins rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Cremer et al. *J Am Chem Soc* 1999, 121:8130-31 ("Cremer").

According to the M.P.E.P., a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Additionally, the identical invention must be shown in as complete detail as is contained in the claim. See M.P.E.P. § 2131.

Claim 45 is directed to a method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate. The method includes comparing height uniformity in a first direction and a second direction across a planar surface of the substrate to identify a first direction having higher substrate height uniformity than a second direction, wherein the first and second directions are planar to the substrate. The method further includes placing the different chemical moieties in a row on the planar surface of the substrate lengthwise along the direction having the higher height uniformity so as to provide a row of different chemical moieties that is more closely aligned with the first direction than the second direction, wherein the row contains a plurality of spatially addressable features containing the different chemical moieties, so as to fabricate the array of multiple features of different chemical moieties on the substrate surface.

An element of the rejected claims is comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher

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uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity.

The Applicants' specification defines a "height uniformity" as the "variation in relative height of the surface moving across the surface in a predetermined direction."

The Office asserts that Cremer discloses the use of square well plates having dimensions of 25 μm x 25 μm and 250 μm x 250 μm and having hydrophobic partitions ranging from 25 μm to 250 μm . See page 8131, column 2. The Office therefore equates this disclosure with the Applicants' claimed comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity.

The Applicants, however, respectfully disagree and contend that although Cremer may have measured the dimensions of the chips and determined the depth of the hydrophobic partitions, Cremer has not determined the variations in the relative height across the surface of the substrate nor has Cremer used that determination to compare height uniformity so as to identify the direction having the higher uniformity so as to place chemical moieties on the surface in a row along the direction having the higher uniformity. Specifically, there is no teaching within Cremer with regard to the variation of substrate surface height or placing chemical moieties on the surface of a substrate based on a comparison of uniformity height. Rather, Cremer discloses using photolithographic techniques for forming wells on a substrate and placing lipids within those wells by use of a capillary tube. Hence, Cremer discloses a completely different method for fabricating an array than that claimed by the Applicants.

In view of the above, Cremer is deficient in that it fails to teach all the elements of the rejected claims. Namely, Cremer fails to teach comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface

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in a row in the direction having the higher height uniformity. Therefore, because Cremer fails to teach all the elements of the rejected claims it fails to anticipate the claimed invention. Consequently, the Applicants respectfully request that the 35 U.S.C. § 102(b) rejection of Claim 45 be withdrawn.

Claim Rejections - 35 USC § 103

Claims 28 and 45 remain rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Cremer, *supra*, in view of Lemmo et al. *Anal Chem* 1997, 69:543-51 and Baldeschwieler et al. (WO 95/25116).

According to the M.P.E.P. § 706.02 (j), to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

As set forth above, an element of the rejected claims is comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity. As described above, Cremer is deficient in that it does not teach these elements. Cremer does not teach or suggest these elements because Creamer merely discloses the dimensions of the chip used and the depth of the wells partitioned in the chip. Further, to the extent that Cremer discloses placing a lipid on to the substrate it is by positioning a capillary tube above the substrate and delivering the lipid on to the substrate, there is no teaching or suggestion that this delivery is in the direction having the higher height uniformity. As Lemmo and Baldeschwieler were cited solely for their disclosure of the use of a pulse jet printer they fail to remedy the deficiencies of Cremer.

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In view of the above, the Applicants contend that a *prima facie* case of obviousness has not been established because the recited combination fails to teach or suggest all the elements of the rejected claims. Consequently, the Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of Claims 28 and 35 be withdrawn.

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CONCLUSION

Applicants submit that all of the claims are in condition for allowance, which action is requested. If the Examiner finds that a telephone conference would expedite the prosecution of this application, please telephone John Brady at (408) 553-3584.

The Commissioner is hereby authorized to charge any underpayment of fees associated with this communication, including any necessary fees for extensions of time, or credit any overpayment to Deposit Account No. 50-1078, order number 10004190-1.

Respectfully submitted,

By:


James S. Keddie
Registration No. 48,920

Date: 31/07

AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
P.O. Box 7599
Loveland, CO 80537-0599

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